# Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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*— and 35 others*

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FISH AND WILDLIFE SERVICE
JOHN L. FARLEY, Director

# Commercial Fisheries Abstracts

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In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0 General and theoretical
1 Fish by species
2 Fresh fish
3 Preserved fish
4 Oils
5 Vitamins
6 Fishery by-products
7 Analytical Methods
8 Composition
9 Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1950

8.64

## THE B-VITAMINS OF COD AND HADDOCK

Hoogland, P. L. (Atlantic Fisheries Experimental Station, Halifax, N. S.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 55, 11-13 (March, 1953)

Very little information is available regarding the vitamin content of fish and the effect of different processing treatments on the vitamins. For this report the amounts of thiamine, riboflavin, niacin, pantothenic acid (free) and $B_{12}$ were determined in cod and haddock. The effects of filleting, freezing, smoking, and prolonged cold storage on these vitamins were determined.

There was considerable variation in the vitamin content of different samples of one type. No significant difference was observed between the amount of vitamins in fresh fish and in fish treated by any of the above methods. There was no appreciable difference between cod and haddock.

Vitamin Content of Cod and Haddock (fresh basis)*

| Vitamin | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Thiamine $\mu g/g$ | C | 0.71<br>.50-1.2 | 0.49<br>.15-.98 | 0.57<br>.40-.78 | | | | 0.56<br>.38-.80 | | |
| | H | 0.26<br>.18-.32 | 0.39<br>.30-.50 | 0.43<br>.17-.64 | 0.60<br>.40-1.1 | | | 0.63<br>.47-1.0 | 0.61<br>.45-.75 | |
| Riboflavin $\mu g/g$ | C | 0.37<br>.28-.44 | 0.23<br>.19-.25 | 0.18<br>.13-.26 | 0.11<br>.02-.30 | 0.83<br>.67-1.1 | | 0.34<br>.24-.40 | 0.24<br>.15-.38 | 0.83<br>.61-1.1 |
| | H | 0.21<br>.18-.23 | 0.17<br>.14-.19 | 0.19<br>.14-.25 | 0.26<br>.11-.35 | 0.12<br>.07-.15 | 0.47<br>.10-.75 | 0.24<br>.17-.37 | 0.24<br>.19-.40 | 0.18<br>.10-.28 |

(over)

 ABSTRACTER: Neva L. Karrick

9.2

## QUARTERLY OUTLOOK FOR MARKETING FISHERY PRODUCTS, JULY - SEPTEMBER 1953.

Anonymous
Fishery Leaflet 336q, United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C. (July, 1953)

This publication is the eighteenth in a series of analyses of economic conditions directed toward predicting the market situation of various fishery commodities during the ensuing three months. The current number forecasts the market outlook for nearly 50 individual fishery commodities for the third quarter of 1953. This material, together with a survey of some elements of the general economic situation, is covered in a space of 38 pages and is illustrated by over 50 charts.

With the heading, "The Outlook at a Glance," the major phases of the report are summarized on the inside front cover. A high level of general business activity, though possibly not as high as that of a year earlier, is forecast in this summary. A large demand for foods is anticipated, but with heavy supplies, so that markets are expected to be somewhat weaker than in the third quarter of 1952. Retail food prices, however, are expected to be fairly steady. Markets for edible fishery products, fresh, frozen, and canned, are expected to be fairly firm. Among byproducts, according to the report, markets for fish meal will be fairly steady, while markets for fish oils and fish-liver oils will be weak. The usual heavy production in the fisheries during the quarter, with a slackening toward the close, is predicted. Cold-storage holdings will probably be lower than in the third quarter of 1952, but following the seasonal trend of increasing volume. A low level of exports of fishery products is forecast for the third quarter and a high level of imports, although imports will not be as high as those of the third quarter of 1952.

(over)

 ABSTRACTER: Ralph Russell

6.193

## PROBABLE IDENTITY OF UNIDENTIFIED CHICK GROWTH FACTORS IN FISH SOLUBLES AND PENICILLIN MYCELIUM RESIDUE

Edwards, H. M.; Dam, Richard; Norris, L. C.; and Heuser, G. F. (Agricultural Experiment Station and Department of Poultry Husbandry, Cornell University, Ithaca)
Poultry Science 32, No. 3, 551 (May, 1953)

In two feeding experiments conducted at Cornell University, fish solubles and penicillin mycelium waste were shown to be of approximate comparable quantitative value as sources of unidentified chick growth factors. Twenty White Leghorn day-old male chicks were used in each experiment. The chicks were weighed individually at the beginning of the experiment and weekly thereafter until the experiment was concluded at the end of four weeks.

The basal diet fed the chicks was composed of 65 grams glucose, 23.5 grams alpha-protein, 5 grams complete mineral mixture, 3 grams ground cellophane, 3 grams hydrogenated fat, and 0.5 grams DL-methionine. Each one-hundred grams of the diet received as an additive 25 mg. iodinated casein, 150 mg. choline chloride, 4 mg. alpha-tocopheryl acetate, 2.7 mg. niacin, 1.5 mg. calcium pantothenate, 200 $\mu$g. thiamine hydrochloride, 400 $\mu$g. riboflavin, 450 $\mu$g. pyridoxine hydrochloride, 15 $\mu$g. biotin, 80 $\mu$g. folic acid, 40 $\mu$g. menadione, 1.5 $\mu$g. vitamin $B_{12}$, 465 I.U. vitamin A, and 40 A.O.A.C. units vitamin $D_3$.

Table 1 (this card, over) shows the plan of the experiments and the results obtained. Both fish solubles and penicillin mycelium residue promoted a marked increase in the gain during the four-week experimental period and reduced the quantity of feed required per gram of gain. Although the chicks fed in experiment 2 failed to grow as rapidly as those in experiment 1, the percentage increase due to the inclusion of fish solubles and penicillin

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 ABSTRACTER: Martin Heerdt

7.879

## THE DETERMINATION OF CARBONYL COMPOUNDS BY SEMICARBAZIDE AND HYDROXYLAMINE

Feuell, A. J. and Skellon, J. H.
Analyst 78, No. 924, 135 (March, 1953)

Monoethenoid fatty-acids and esters, after catalytic autoxidation for several hours at temperatures above 100°C., develop reducing properties, which are apparently due to the formation of various types of carbonyl compounds. The application of the semicarbazide method to oxidized oils possessing marked reducing properties was disappointing, as semicarbazones could not be precipitated; the method consequently failed.

In view of the inapplicability of the semicarbazide method to oxidized materials it was decided to use hydroxylamine, and the recent method of Maltby and Primavesi (Analyst 74, 498 (1949)) was modified in two ways, as follows--

(1) By the use of two reagent solutions instead of a single one, so that interference from colour inherent in the sample is eliminated and, to a lesser extent, variations from neutrality in the sample are simultaneously compensated. Both these improvements can be achieved by using only about 25 percent (by weight) more of sample than is required for a determination by the original method.
(2) By making the matching procedure equally easy in either daylight or artificial light.

Hydroxylamine reagents--Reagent A. Dissolve 20 g. of hydroxylamine hydrochloride in 100 ml. of water, make up to 1 litre with 95 percent alcohol, and add 25 ml. of a 0.2 percent alcoholic solution of bromophenol blue. Heat on a water-bath for 30 minutes to react with any carbonyl compounds in the alcohol, cool, and adjust the colour as seen in the bulk to the neutral dichroic green-red with 2N alkali.

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EFFECT OF PROCESSING ON B VITAMINS

UNIDENTIFIED GROWTH FACTORS

QUARTERLY OUTLOOK REPORT

DETERMINATION OF CARBONYL COMPOUNDS

6.193

mycelium residue in the basal diet was approximately the same at all comparable levels. Improvement in efficiency of feed utilization in experiment 2, however, was not as great as that obtained in experiment 1, due presumably to the slower rate of gain.

The addition of procaine penicillin to the basal diet in experiment 2 promoted an 11.4 percent increase in weight over the lot fed the basal diet only. When procaine penicillin was included in the diet along with fish solubles or penicillin mycelium residue, however, the weight increase due to the procaine penicillin was either non-existent or greatly reduced.

TABLE 1.—*Effect of fish solubles and penicillin mycelium residue on chick growth and feed efficiency*

| Treatment | Avg. gain at 4 wks. | | Gain per gm. feed | |
|---|---|---|---|---|
| | Exp. 1* | Exp. 2* | Exp. 1 | Exp. 2 |
| | gm. | gm. | gm. | gm. |
| Basal diet | 197 | 166 | 2.31 | 2.41 |
| +1.5% fish solubles (FS) | — | 194 (16.9) | — | 2.32 |
| +3.0% FS | 235 (19.3) | 201 (21.1) | 1.63 | 2.34 |
| +4.5% FS | — | 217 (30.7) | — | 2.31 |
| +3.0% penicillin mycelium residue (PMR) | — | 201 (21.1) | — | 2.23 |
| +6.0% PMR | 244 (23.9) | 211 (27.1) | 1.76 | 2.27 |
| +9.0% PMR | — | 206 (24.1) | — | 2.24 |
| +3.0% FS+6.0% PMR | 272 (38.1) | 218 (31.3) | 1.77 | 2.38 |
| +1 mg./100 gm. procaine penicillin (PP) | — | 185 (11.4) | — | 2.43 |
| +3.0% FS+1 mg./100 gm. PP | — | 192 (15.7) | — | 2.40 |
| +6.0% PMR+1 mg./100 gm. PP | — | 220 (32.5) | — | 2.23 |

* Values in parentheses are percentage increases in gain over lot fed basal diet only.

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Reagent B. Prepare as for reagent A but use 5 g. of sodium or ammonium acetate instead of the hydroxylamine; this imparts a slight buffering action. This solution need not be heated. Adjust its colour with 2N acid until it matches that of reagent A. The exact tint is not criticial within reasonable limits, and it is immaterial whether reagent B is adjusted to match reagent A or vice versa. The solutions keep well, but should be re-matched before they are used. Prepare 4 volumes of reagent A for each volume of reagent B.

Matching.--Match in paired boiling or Nessler tubes instead of in conical flasks as in the original method, using about 20 ml. of each solution.

Procedure---Dissolve the sample (corresponding to 0.002 to 0.004 gram-molecules of carbonyl compound) in 25 ml. of water or alcohol, and add 20 ml. of this solution to a flask containing 60 ml. of reagent A. Add the remaining 5 ml. to 15 ml. of reagent B in one of a pair of tubes. The colour of the indicator in both reagents is thus equally affected by dilution and inherent sample colour.

Set the sample aside for 5 to 10 minutes and then titrate it with 0.2N alkali to match reagent B, a proportionate amount of water (one-quarter of the titration volume) being added to reagent B. With a little practice it is possible to titrate the liquid in the flask to a point just on the acid side of neutrality, as seen by the colour in bulk. Pour some of the mixture into the other tube and compare the two. If the liquids are not matched return the contents of the tube to the flask and cautiously continue to titrate, transferring a suitable volume to the tube from time to time for exact comparison. When the solutions are matched, set them aside for a further 5 to 10 minutes and compare them again, as some compounds react slowly. Finally, loosely stopper the two flasks, place them on a water-bath for 20 minutes, cool and titrate if necessary to ensure final matching; this may be necessary for compounds that do not react in the cold. Water must always be added to reagent B in the same proportion, one-quarter of the titration volume, before final matching.

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Vitamin Content of Cod and Haddock (fresh basis)*

| Vitamin | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Niacin μg/g | C | 32.3<br>24-37 | 25.7<br>23-33 | 23.2<br>14-36 | | 10.1<br>8.4-12 | | 29.3<br>21-35 | | 14.9<br>13-17 |
| | H | 33.9<br>29-36 | 37.2<br>32-43 | 34.6<br>28-39 | 30.8<br>27-33 | | 30.3<br>19-35 | 45.6<br>39-52 | 38.8<br>35-46 | |
| Panto-thenate μg/g | C | 1.05<br>.78-1.6 | 1.11<br>.81-1.5 | 0.96<br>.69-1.5 | 1.28<br>.93-1.9 | 1.66<br>1.3-2.0 | | 1.58<br>1.3-2.3 | 2.24<br>1.7-3.4 | 3.04<br>2.8-3.4 |
| | H | 1.38<br>1.1-1.9 | 0.89<br>.38-1.5 | 0.90<br>.68-1.2 | 0.49<br>.31-.60 | 1.07<br>.75-1.5 | | 1.14<br>.68-1.6 | 1.66<br>1.6-1.9 | 1.17<br>.70-1.8 |
| Vitamin $B_{12}$ mμg/g | C | 5.2<br>2.2-8.8 | 4.7<br>1.8-10 | 6.3<br>4.3-12 | 4.5<br>2.2-9.9 | | | 11.8<br>3.6-22 | 10.5<br>1.9-24 | 20.2<br>16-27 |
| | H | 12.6<br>7.8-18 | 12.1<br>5.6-18 | 13.7<br>8.1-22 | 12.0<br>5.4-18 | 7.8<br>4.2-11 | | 12.9<br>11-14 | 11.3<br>8.0-20 | 5.8<br>3.7-11 |

Lower figures represent range. * For each vitamin, 5 samples were analyzed in duplicate.

1--Round fish
2--Fresh fillets
3--Frozen fillets, not stored
4--Frozen fillets, stored 1 month
5--Frozen fillets, stored 3 months
6--Frozen fillets, stored 6 months
7--Smoked fillets, not stored
8--Smoked fillets, stored 1 month
9--Smoked fillets, stored 3 months

9.2

The Outlook Report predicts a strong market for fresh and frozen shrimp, for canned shrimp, and for croaker. A firm market for bluefish, sea trout, and swordfish is forecast, and a fairly firm market for sablefish or black cod, canned herring, mullet, mild-cured salmon, spiny lobsters, and canned oysters. A steady market is predicted for flounder and sole, red snapper, and canned mackerel, while a fairly steady market is anticipated for butterfish, mackerel, ocean perch, fresh salmon, frozen salmon, canned salmon, canned sardines, sea bass, canned tuna, clams, canned crab meat, lobsters, scallops, and fish meal. According to the report, unsettled markets will prevail in scup, salt herring, rockfishes, canned clams, fresh crabs and crab meat and the major species among the higher-priced fresh-water fish, such as whitefish, yellow perch, blue pike, and yellow pike. A dull market is predicted for cod, halibut, and pollock, and the coarser fresh-water species, such as carp, buffalofish, sheepshead, and suckers. Weak markets are forecast for haddock, whiting, fish oils, and fish-liver oils.

2.19 HANDLING TROLL SALMON -- FISHERY NOTE NO. 36

Anonymous
U. S. Department of the Interior, Fish and Wildlife Service, Fishery Products Report No. 90, Seattle, Washington (May 8, 1953)

Ocean-caught troll salmon is one of the finest of all food fishes, or of any kind of food for that matter. It must be handled with extreme care if the quality is to be preserved. No technological work was done by the Service in this specific field. Handling suggestions were submitted by an experienced processor of mild-cured salmon.

1. Fish should be stunned before gaffing and landing to prevent thrashing on deck and causing the fish to bruise itself.

(a) Stunning and gaffing any place except in the head, is to be avoided for otherwise such bruises and gaff marks result in the blood coagulating around the clubbed and gaffed part of the salmon. To the consumers, such blood spots render the salmon second class, resulting in a lower return to the fishermen.

2. Cleaning should be done soon after landing the fish aboard. Some types of feed cause belly burn in a very short period of time.

3. Cleaning should be done with care. All the parts of the entrails that could carry the stomach acids should be removed, as well as complete removal of the gills. All blood must be removed from the backbone and neck section. Blood remaining in any part of the fish will cause rapid bacteria increase and flesh discoloration.

4. Fish should be transferred to the hold soon after cleaning. Exposure to the air and sun soon causes flesh to soften.

5. Care should be taken to preserve the scales and avoid any rough handling that will break or bruise the flesh of the fish. A drop from the deck to the hold can cause damage to the carcass that will make it inferior for marketing.

6. If a metal scraper is used, care should be exercised in the amount of pressure used. A very light application of the instrument is advised and a rag employed to remove loose blood.



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3.231 A PORTABLE IMMERSION FREEZER-- TECHNICAL NOTE NO. 24

Oldershaw, C. G. P.; Holston, John A.; and Pottinger, S. R. (Fishery Technological Laboratory, U. S. Fish and Wildlife Service, Boston, Massachusetts)
Commercial Fisheries Review 15, No. 2, 32-34 (February, 1953)

A portable immersion freezer for use in the Service's experimental "freezing fish at sea" studies was designed and built to fill the following requirements:

1. Allow rigid control of immersion time of the fish and brine temperature during the freezing process.
2. Facilitate easy and rapid changes in concentration or composition of the freezing medium.
3. Be easy to transfer from laboratory to vessel and be capable of operation at either location.
4. Have sufficient capacity to lower the temperature of the freezing medium to -40°F. and to maintain the temperature to within ± 1°F. when 4 or 5 haddock (approximately 12 pounds) are immersed in the medium.
5. Have a relatively low initial cost.
6. Have a low electric power demand, since power available on the Delaware is limited.
7. Be easy to dismantle for cleaning.

The apparatus consists essentially of two insulated tanks (see diagram). One tank contains the refrigerant, an alcohol-dry ice mixture, and the other, the freezing tank, contains the immersion-freezing medium and a coil of finned tubing. A rotary positive displacement pump, powered by a 1/4-h.p. motor, circulates the chilled alcohol from the refrigerant tank through the coils in the freezing tank by means of a piping system

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 ABSTRACTER: Roy C. Stevens

3.239 CAUSES OF LOSS IN WEIGHT OF FROZEN PACKAGED SHRIMP

Fieger, E. A.; Frilox, James J.; and Norton, E. J.
Fishing Gazette 70, No. 4, 44 (April, 1953)

Processors of shrimp have experienced difficulty in estimating or determining the excess amount of shrimp that must be placed in a package so that the purchaser or consumer will obtain the stated weight when the shrimp are thawed. In general this problem results from loss of moisture from the product. Moisture losses during frozen storage may occur from desiccation due to lack of protection by proper packaging or ice glazing. Losses on thawing or "drip" occur as a result of the rupture of cells during freezing, storage, and thawing. Drip presents the greatest problem and is discussed here in greater detail.

A study was made to determine the effect of the length of time shrimp were stored in crushed ice upon the amount of drip produced when the shrimp were frozen and thawed. The results obtained, as shown in table 1, indicate that this loss is appreciable and increases with the length of iced storage. Sample 1 were Gulf shrimp, caught early in the morning, which were transported to the laboratory and repacked in ice at 4:00 P.M. The first sample for drip determination was taken the following morning and was designated as 24-hour storage. The shrimp used in sample 2 were caught in Lake Pontchartrain at 8:00 A.M., transported to the laboratory, then headed, washed and repacked in ice at 1:00 P.M. The zero time sample was taken at this time. From the data presented it is evident that as quality gets poorer, drip losses become greater.

Paired samples were taken from a commercial shrimp packing line, one of the pair representing the commercial pack and the other representing the culls. The results of

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 ABSTRACTER: Roy C. Stevens

2.116 LORAN BECOMING STANDARD TRAWL BOAT EQUIPMENT

Anonymous
Pacific Fisherman 51, No. 5, 41 (April, 1953)

A recent survey has disclosed that close to 75% of the trawling vessels fishing out of Oregon ports are using loran equipment.

Many Pacific Coast trawl skippers no longer give their position by latitude and longitude, but by loran line readings. This device has proved to be a valuable asset not only for navigation, but for plotting drags, and for maintaining the vessel's position over good fishing grounds. It has also shown itself to be an important time saver in running to and from various banks.

Loran is used by trawl fishermen in measuring their tows, making drags of so many microseconds in length. This method is considered superior to timing tows by hours and minutes, as it indicates the actual distance the net has traveled, as well as the true course the boat has taken.

Loran tables and charts are published by the U. S. Hydrographic Office, which also publishes tables from which loran lines may be plotted on any chart or plotting sheet. West coast loran facilities have been greatly improved in recent years by the addition of more stations and by increasing the power of existing installations. Three new loran stations have recently been established in the Gulf of Alaska to service this region. During daylight hours loran can be used as far as 700 to 1000 miles offshore, and by using sky-wave reflections at night, fair readings may be obtained up to 1400 miles from shore.

 ABSTRACTER: Roy C. Stevens

HANDLING TROLL-CAUGHT SALMON

DRIP LOSSES IN FROZEN SHRIMP

PORTABLE IMMERSION FREEZER

USE OF LORAN ON TRAWLING VESSELS

3.239 (Cross References: 3.239, 1.85)

tests with these shrimp (table 2) demonstrate conclusively that if such shrimp are not removed, it not only results in a poorer appearing pack, and one of lower quality, but it can also result in a lowered drained weight when the product is thawed.

TABLE I
Effect of Ice Storage on the Quantity of Drip

| Iced Storage Time | Quantity of Drip Sample 1 oz/5 lb. | Sample 2 oz/5 lb. |
|---|---|---|
| 0 | | 3.4 |
| 24 | 3.4 | 3.6 |
| 48 | 3.4 | 3.2 |
| 72 | 3.5 | 3.9 |
| 96 | 3.3 | 4.5 |
| 120 | 3.6 | — |
| 144 | 3.6 | 4.6 |
| 168 | 4.4 | 4.9 |
| 192 | 4.4 | |
| 216 | 4.0 | |

TABLE II
Effect of Quality upon Quantity of Drip of Commercial Shrimp

| Samples No. | Quality rating | Drip Oz/5 lb. |
|---|---|---|
| 3 | Excellent | 3.1 |
| 4 | Culls (soft rather than spoiled) | 3.6 |
| 5 | Excellent | 3.2 |
| 6 | Culls | 5.0 |
| 7 | Good | 3.4 |
| 8 | Culls | 5.7 |
| 9 | Fair | 3.8 |
| 10 | Culls | 4.3 |

2.19 (Cross References: 2.08, 1.3)

7. Large fish are more susceptible to careless handling than the smaller fish due to the added weight. When cleaning the fish, a one-handed hold on the collar bone with the fingers extending inside of the fish often breaks the meat between the ribs. A short drop with the fish landing on the head or tail will break the fish in the heavy section in the middle.

8. Proper icing is very important to the keeping quality of salmon.

(a) All blood accumulation between the dressing and icing should be wiped clean with a cloth.

(b) The bottom of the bin should be iced to a depth of 18 inches to 24 inches.

(c) The fish should be placed belly up and tail to tail beginning at the outboard or next to the skin. Sufficient ice between the fish and any wood is good practice for best results. The bellies and between the fish should be iced freely with generous icing between layers and finally top icing. Sacks or canvas over the top of the filled bin will preserve your ice and fish from deteriorating air circulation.

9. Day fish can be damaged by exposure on deck to wind and sun without it being immediately apparent. The damage develops within 48 hours in the softening and breaking down of the tissues. This limits the marketing to immediate consumption or processing.

The "day fisherman" can best protect his product by using wet sacks under the fish in the deck bins and over the top for protection against the direct rays of the sun. The sacks should at all times be kept wet for insulation.

(a) Extreme care must be taken during hot sunny weather in regard to salmon on deck. The sun's rays hitting on the back of a large prime salmon will soon start bacterial action resulting in deterioration. It is for this reason that the salmon should be cleaned and placed in the hold as soon as possible or, if left on deck, be kept under wet sacks at all times.

10. The rapidity of bacterial growth from salmon calls for cleanliness at all times in the knives, rags, and sacks used, as well as the fish hold. These implements and facilities readily pick up bacteria when in contact with fresh salmon which, if not removed, multiply rapidly, contaminating additional catches brought aboard.

Chlorine and salt are very good agents for reducing bacteria. A sweet-smelling hold is relatively free from bacteria.

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equipped with the necessary valves and flexible connections. Two laboratory stirrers are mounted on the freezing tank to agitate the freezing medium. Both tanks are set into plywood casings insulated with four inches of glass wool. An insulated, hinged cover is provided for the refrigerant tank.

A vertical removable baffle fitted with a screened opening divides the refrigerant tank into two compartments. The inlet for warmed alcohol from the freezing tank is on one side of the baffle and the outlet for chilled alcohol on the other. The baffle insures adequate contact of the warmed alcohol and the cold dry ice on one side and the screen prevents passage of the dry ice to the outlet side and thence through the coil system.

The temperature of the freezing medium is controlled by regulating the flow of chilled alcohol through the coils.

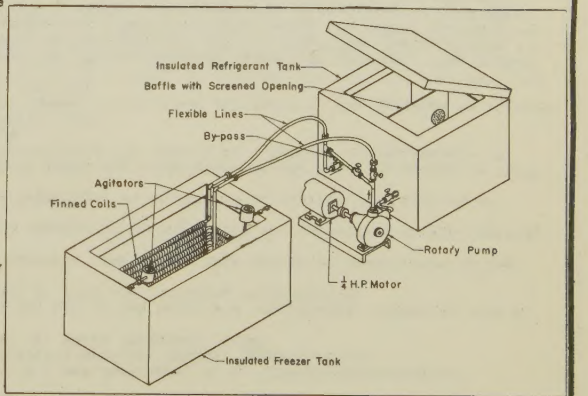


FIGURE 1 - DIAGRAM OF THE PORTABLE IMMERSION FREEZER.

3.230 QUICK FREEZES AND CARTONS SHRIMP AT SEA

Wright, C. E.
Food Engineering 25, No. 5, 133 (May, 1953)

Shrimp are now being packaged and frozen in 5-pound cartons ready for marketing by a Miami, Florida firm aboard the San Marcos, a converted 104-foot army vessel. Each regular run to the Campeche beds off the coast of Mexico requires a period of 30 to 35 days to make the 1400-mile round trip journey and obtain approximately 30,000 pounds of packaged shrimp.

The operation aboard the vessel begins with the arrival of the trawl on board. Shrimp are dumped from the net into a shallow 10-by 14-foot box on the port side of the deck. After being washed 2 times in clean sea water the shrimp are headed, transferred immediately to a pre-chilling vat, and cooled to 40°F. within 1 hour. This vat is 3 x 4 x 6 feet in size and holds 2,000 pounds when full. After chilling, the shrimp are removed from the vat, packed into cartons, and quick frozen in one of two 1,000-pound capacity freezer cabinets.

A fresh water ice-glaze is applied to each carton full of frozen shrimp before it is placed into one of the -5°F. holding rooms aft or amidship. Only 2 hours is required for processing from the time the trawl is emptied until the cartons full of headed shrimp enter the freezer.

 ABSTRACTER: Martin Heerdt

3.33 FISH HANDLING AND PROCESSING IN EUROPE -- CANNING

Empey, W. A. (C.S.I.R.O. Division of Food Preservation)
Fisheries Newsletter (Australia) 12, No. 3, 8, 23 (March, 1953)

The present annual production, in metric tons, of canned fish in the four European countries visited by the author is approximately 40,000 in Norway, 35,000 in France, 7,500 in Denmark, and 6,000 in the Netherlands. The annual production of semi-sterile marinated canned fish products in these countries amounts to about an additional 50,000 metric tons.

In order of importance, the chief canned species are sardines, sild (immature herring), brisling (sprats), tuna, mature herring, and mackerel. Also canned in smaller quantities are whitefish (chiefly in the form of fish cakes and fish balls), lobster, and miscellaneous species. Canned marinated fish products are prepared chiefly from herring (including silds) and to a lesser extent from brisling and anchovies.

Because of the seasonal nature of the fisheries and the fact that a large proportion of the sardines and herring-like species are packed in relatively small cans and by methods involving a great deal of hand labor, there are a great number of fish canneries. The use of mechanized methods, however, is increasing.

Although Norwegian sild and brisling are often commercially called sardines, the canning of true sardines is carried out principally in France. Sardines are usually canned the same day as they are caught, though sometimes they are held overnight, headed and gutted, in wire mesh trays in chill rooms. The headed and gutted fish are washed and then soaked in concrete tanks containing saturated salt brine with additional coarse salt on top. On removal from the brine the fish are packed on wire trays at a 45-degree angle

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 ABSTRACTER: Roy C. Stevens

2.8 USE OF FISH IN NEW ENGLAND SCHOOLS INCREASED BY DEMONSTRATIONS

Lindgren, B. E. and Seifert, R. P. (Educational and Market Development Section, U. S. Fish and Wildlife Service, Washington, D. C.)
Commercial Fisheries Review 15, No. 2, 18-22 (February, 1953)

A total of 38 fish-cookery demonstrations were presented for school-lunch personnel in the New England states of Maine, New Hampshire, Vermont, Rhode Island, and Connecticut during 1950 and 1951 by the Branch of Commercial Fisheries of the U. S. Fish and Wildlife Service. Conducted as a part of the Service's national program to develop markets for fishery products, these demonstrations affected the eating habits of nearly 90,000 children, or 60 percent of those eating in the school lunchrooms of these five states.

To evaluate the effectiveness of the program in increasing the use of fish in the schools represented, a comparison was made between periods before and after the demonstrations. As a control, a similar comparison was made in schools not represented but otherwise comparable.

It was found that before the demonstrations the average school represented at the meetings served fish 1.7 times per month. After the demonstrations the use of fish at these schools was increased to 2.7 times per month -- an increase of 59 percent. Consumption of fish was also increased in schools that were not represented at the demonstrations. This was partially attributed to the program, because after the demonstrations, all of the state directors did more to encourage the use of fish. Fish recipes especially designed for school use were also provided by the Fish and Wildlife Service for distribution to school-lunch managers who were not able to attend.

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 ABSTRACTER: Roy C. Stevens

3.230 NO-SMEAR MEAT SAWING MAY BE APPLIED TO FISH -- FISHERY NOTE NO. 37

Anonymous
U. S. Department of the Interior, Fish and Wildlife Service, Fishery Products Report No. 101, Seattle, Washington (May 25, 1953)

A "smear remover" recently developed by researchers in the U. S. Department of Agriculture to eliminate a bothersome and time-consuming task in connection with cutting meat on a power saw, may be of use to fish dealers who steak large quantities of frozen fish. "Smear" in the meat industry is bone dust and fat particles left on meat cuts by power saws. An objectionable "sawdust", comparable to this "smear" occurs when large quantities of salmon, swordfish, or other fish are steaked. This "smear" or "sawdust" detracts from the appearance of the cuts and can contribute to bacterial growth.

The "smear remover" consists of a series of stainless steel leaf-type springs, each of which has one or more holes, that are used to scrape the outer surface of the meat as it passes by the springs. The holes for horizontally successive rows of springs are offset to permit scraping the entire outer surface of the cut.

To work properly, it is necessary that the operator hold the meat firmly against the "smear remover" so that all of the outer surface of the meat rubs against the attachment as the meat is pushed past the saw. For many meat cuts this is said to take no more time than power sawing without the "smear remover". Properly used, the attachment leaves meat cleaner than when a scraper or a cloth is used. Operators have expressed the opinion that it leaves the cut as clean as if made with a knife.

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 Reprinted in whole

FREEZING SHRIMP AT SEA

SCHOOL-LUNCH FISH COOKERY DEMONSTRATIONS

CANNING SARDINES IN EUROPE

CUTTING OF FROZEN FISH STEAKS

2.8 (Cross Reference: 2.6)

The demonstrations were conducted by a Home Economist and a Fishery Marketing Specialist of the Service in cooperation with the Department of Education in each state. Each demonstration was attended by an average of 50 school-lunch cooks and managers.

Only kitchen-tested recipes especially designed for school use and well within the reach of the average school budget were chosen for the demonstrations. In addition to instruction on fish preparation, those in attendance received information on the nutritive value of fish, its local availability, purchasing hints, and suggestions for proper storage. The manager of each school was furnished recipes and other fishery publications to take back to her own lunchroom.

Because the eating habits learned by the children at school are also communicated to their homes, it is felt that the demonstrations can help to increase the use of fish in the community as a whole. Thus, the fishing industry, the children, and their parents all benefit from this program.

3.230

Tests in two stores indicated that the "smear remover" increased production of their cutting operations 20 to 30 percent on meat cuts requiring cleaning, and saved 3 to 4 1/2 man-hours weekly in an average size supermarket. It is estimated that the attachment will cost $60 to $75. Developers of the invention have made their rights in it available to the public on a free-use basis.

This information is taken from a report, "Handling Meats in Retail Food Stores, Part 1," which should be available in printed form from the Office of Information Services, Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C., within a month or so.

3.230 (Cross Reference: 1.85)

3.33 (Cross Reference: 1.2)

with their tails upwards. When packed full, the trays are dipped a few times in tanks filled with fresh water and then stacked on racks to drain.

Pre-drying of the fish packed in grills on special racks is usually done for 30 minutes at about 104°F., or in some cases at ordinary room temperatures in wooden tunnels under forced air circulation.

Pre-cooking is accomplished by immersing the grills in hot oil at about 230°F. for two to three minutes. In some plants the trays are dipped by hand, whereas in others they are carried through the hot oil bath on conveyor belts. Peanut oil and Norwegian sild oil are the frying oils most commonly used. After the fish have been dried, either in air or in drying tunnels, and thoroughly cooled, they are trimmed when necessary and packed by hand into flat rectangular cans.

Filled with oil, either by hand or on a belt under an automatic filler, the cans are then heat exhausted, sealed and retorted.

An effective automatic system for handling cans packed with beheaded, eviscerated and washed sardines has been developed in Belgium and is now being used by some plants in France. This method has been described in a previous abstract.

Because of the delicate and fragile nature of the sardines processed in France, experiments with the use of eviscerating machines have not been too successful. Gutting is not necessary with the Norwegian brisling which is held alive in pounds until completely freed from feed.

4.90 RESEARCH REVEALS VALUE OF FAT IN ANIMAL FEEDS

Draper, Norman (The American Meat Institute Foundation, Chicago)
Feedstuffs 25, No. 19, 89 (May 9, 1953)

Recent experiments have shown that feed rations containing fat have a beneficial effect upon the growth, feed utilization efficiency, and quality of animals. Experiments at the University of Missouri proved that tankage containing 60 percent protein and 8 percent fat was a very important ingredient in the diet of three pigs that reached 201, 195, and 191 pounds, respectively, at four months of age. The pigs received a diet containing 10 percent tankage during their growing-fattening period. Rapid growth in this instance produced lean meat type carcasses that graded choice No. 1. The sow that produced these pigs received a ration containing 4 percent tankage during gestation.

At the University of Nebraska, steers on a diet containing added beef tallow pellets were 32 pounds heavier than control animals after 133 days of feeding. The Texas Agriculture Experiment Station found that steers receiving high levels of fat in their diet required about 100 pounds less feed for each 100 pounds of gain as compared with steers receiving low levels of fat. Surprisingly, rib cuts from the steers on the high-fat levels contained a somewhat higher percentage of lean meat. Blood plasma from these steers also contained a higher level of vitamin A, carotene, and fat.

Research completed by the American Meat Institute Foundation indicates that fat can be utilized benefically in dog rations. Cocker spaniel pups on a commercial dog meal diet plus added choice white animal grease gained 383 grams per week as compared with a gain of only 334 grams per week by similar pups on the plain meal. When given a free choice, the dogs selected the ration with the added animal grease 4 out of 5 times in

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 ABSTRACTER: Martin Heerdt

6.133 OIL RECOVERY FROM WHALES

Heyerdahl, Eilif Fredrik
Food Manufacture 28, No. 5, 209 (May, 1953)

The author recently obtained a patent (British patent number 685,122) on a method for recovering oil from whales or other marine mammals. Briefly, the method is said to prevent the formation of stable oil emulsions that do not yield their oil on subsequent clearing. Ordinary digestion of the flesh and blubber from marine mammals yields an acid emulsion residue. However, if bones are digested along with the flesh and blubber, emulsification of the oil is diminished, the pH of the residue is lowered to 7.2-7.3, and 95 percent of the oil can be recovered from the emulsion residue.

The acid emulsion residue from the customary digestion of flesh and blubber is usually treated as a waste product and blown overboard in practically unlimited quantities. Additional profits can be realized from this liquid material simply by using it in varying quantities to bring about the digestion of bones. Bone digestion in the acid emulsion residue takes place without appreciable emulsification, yields a residue with a fat content of less than 1 percent, and makes the recovery of additional oil possible.

 ABSTRACTER: Martin Heerdt

6.133 THE PRODUCTION OF HERRING OIL

Lovern, J. A.
Fish. News, Lond., No. 1985, 14 (1951)

The amount of herring used in the United Kingdom for the production of oil and meal increased from 2,000 tons in 1946 to 22,000 tons in 1949, and the estimated amount for 1952 is 140,000 tons. British practice attempts to avoid the undesirable features both of North American factories, where capacity is sufficient to deal with all raw material within 24 hours of receipt, and hence plant is partly idle for much of the season, and of Norwegian factories, where, in order to keep plant operating continuously for long periods, it is usual to store large amounts of raw material with no preservative other than a little salt, so that deterioration in yield and quality of oil is unavoidable. The traditional methods for the cooking and pressing of herring are discussed; their efficiency varies directly with the oil content of the raw material, recovery of oil being 90% from herring containing 20% of oil, and only 60% from herring containing 5% of oil. Solvent extraction of oil, and the use of formaldehyde as a preservative, are also considered. An adaptation of the alkali digestion process used for the production of fish liver oils is being successfully applied to the storage of herring and the extraction of oil, and yields a pale, almost odourless, neutral oil, suitable for the edible fat industry. Work is in progress on the problem of recovering meal, which is made more difficult by the alkali process.



(The above abstract appears in Food Science Abstracts 25, No. 2, 144, March, 1953 and is reprinted here)

3.33 FISH HANDLING AND PROCESSING IN EUROPE -- CANNING BRISLING AND SILD

Empey, W. A. (C.S.I.R.O. Division of Food Preservation)
Fisheries Newsletter (Australia) 12, No. 4, 15, 17 (April, 1953)

Large-scale canning of brisling or sprat (Clupea sprattus) and of sild or immature herring (Clupea harengus) is carried out in Norway.

Although the entire year's supply of brisling for a particular area may be caught within 10 days, the fish, which are generally caught with purse seine nets, may be held alive in temporary net enclosures or pounds for up to a month or longer. Government regulations require that brisling must contain at least 7 percent of oil and must be held at least 3 days in the pounds before they can be used for canning. These regulations do not apply to sild.

At the factories the fish are washed in tubs of water and immersed in a fairly strong brine for 15 to 30 minutes. This usually removes most of the scales, especially from the small fish, but the larger fish that may require descaling are passed through squirrel-cage washers where they are sprayed with water before brining.

After draining, the fish are placed heads downward in racks and a rod is pushed through an opening at one end of the rack through the heads of all the fish in the row. The rods with the fish suspended from them are placed on metal frames which are fitted into smoking kilns. In the horizontal tunnel type of kiln, which may be as much as 50 feet long, smoke and air are drawn through by means of a suction fan. The fish enter the tunnel at the fan end where the temperature of the smoke is about 180°F. and leave at the

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 ABSTRACTER: Roy C. Stevens

NUTRITIVE VALUE OF FAT IN ANIMAL FEEDS

HERRING OIL PRODUCTION

OIL RECOVERY FROM WHALES

CANNING BRISLING AND SILD

3.33 (Cross Reference: 1,2)

opposite end where the smoke enters at about 270°F. Temperature control is effected by means of manually-operated dampers. The smoking and cooking operation requires between 25 and 50 minutes.

After smoking and cooling, the fish are beheaded by pressing each frame up against a long slanting knife. They are collected in small pans on a conveyor beneath the cutting device. The fish are trimmed where necessary and hand-packed into flat rectangular cans containing a little olive or sild oil. After inspection, the trays of filled cans are placed by hand under an automatic device which delivers a fixed volume of oil into each can. The cans are then vacuum-closed and retorted in a manner similar to that used for glass containers.

The aluminum cans, which are often used in Norway for the brisling and sild packs, are not able to withstand internal pressures greatly in excess of external pressures in the retorts. The cans are submerged in water while cooking and an additional air pressure of approximately 8 pounds per square inch is maintained in the retorts. When retorting is completed, cold water is introduced into the retort and the air pressure is not reduced until the cans are cooled.

4.90

preference to the plain meal. A fat content of 8 percent proved very satisfactory in the diets of both puppies and mature dogs.

With regard to the development of rancidity, foundation research also has determined that mixed feeds containing greases or tallows stabilized with antioxidants do not become rancid after storage for 1 year at room temperature. Much of the fat in feed meals of vegetable origin is presently being lost as a result of the solvent extraction processes that have become popular since 1944. Once the natural fat has been removed for other uses, feeds compounded from these meals may be deficient in fat. Animal fat, which is almost entirely digestible and of apparent value in the growth of all animals, can be used to advantage in supplying the need for added fats in mixed feeds.

6.133 (Cross Reference: 1.95)

8.53 THE LIPIDS OF FISH. 1. CONTENT AND CONDITION OF LIPIDS IN THE FLESH OF THE HADDOCK (GADUS AEGLEFINUS)

Lovern, J. A. (Dept. of Scientific and Industrial Research, Torry Research Station, Aberdeen)
Biochemical Journal 54, No. 1, 126-128 (April, 1953)

Finely ground haddock flesh extracted with petroleum ether gave from 0.06 to 0.13% lipid (from one sample to another) with iodine values ranging from 82 to 188. When the extracted tissue was dried in vacuo and re-extracted with petroleum ether, 0.02% to 0.03% additional lipid with iodine values of from 13 to 90 could be obtained. Subsequent ethyl ether extraction yielded 0.03 to 0.11% lipid with iodine values ranging from 28 to 132. On the average, the three fractions amounted to 0.10%, 0.02% and 0.05%, or a total of 0.17%. The three-times-extracted tissue, when further extracted with cold ethanol, gave an additional 0.1% lipid or, when hot ethanol was used, 0.5%. The cold-ethanol-extracted tissue gave, upon extraction with chloroform, an additional 0.15% lipid, while the hot-ethanol-extracted tissue gave only about 0.05%. The ethanol extracts had iodine values of about 40 and the chloroform extracts of about 60.

If the final extracted tissue were hydrolyzed with acid, an additional 0.4 to 0.6% lipid could be obtained in the case of the tissue treated with cold ethanol. If hot ethanol had been used, about 0.1% additional lipid could be recovered after acid hydrolysis. The iodine number of the lipid obtained after acid hydrolysis varied from 90 to 164. A total of 0.75 to 1.1% lipid was obtained by these procedures.

In another series of extractions, lipids were separated by acetone extractions followed by extractions with other solvents. By such a procedure as much as 1.37% lipids could be obtained.



7.45 FOCUS ON THE CHEMICAL TOXICOLOGY OF ARSENIC. ITS PRESENCE IN CRUSTACEA AND MOLLUSCS

Kohn-Abrest, E.
Ann. Falsif. 44, 13-16 (1951)

The determination of arsenic involves the destruction of organic matter; this is effected with chlorate and hydrochloric acid (Ogier's method) when mercury is also being determined, but more usually by nitric and sulphuric acids (Deniges' method). A detailed account is given of the latter method, with the modifications found useful by the author, and also of the subsequent determination of arsenic (1) on paper strips as the arseno-bromide of mercury, and (2) in a special form of Marsh's apparatus. The amounts of arsenic found in various sea foods were: crabs, 2.2 mg per kg; shrimps, none; and oysters, from 3 mg per kg to insignificant amounts. The results appear to vary with species and with habitat, and it would be difficult to agree on a figure for normal arsenic content.

 (The above article appears in Food Science Abstracts 25, No. 2, 156, March, 1953 and is reprinted here)

7.611 DETERMINATION OF VITAMINS A AND E BY PAPER CHROMATOGRAPHY

Brown, James A. (Eli Lilly & Co., Indianapolis)
Analytical Chemistry 25, No. 5, 774-777 (May, 1953)

Vitamin E interferes with the spectrophotometric determination of vitamin A, especially when the current U.S.P. method of assay is used. Spectrophotometric determination of both vitamins is interfered with by (1) different absorption patterns of different forms of the vitamins, (2) absorption patterns of similar compounds which are biologically inactive, and (3) absorption pattern of the vehicle. A method is proposed wherein the vitamins are separated from each other and from other interfering substances by paper chromatography followed by determination employing a modified recording spectrophotometer. The separation employed depends upon the fact that the various forms of vitamin A can be separated from each other and from Vitamin E by means of silicone-impregnated strips and an acetonitrile-water solvent system.

Strips of 0.5-inch Whatman No. 1 filter paper were immersed in a suspension consisting of 25 grams of Dow Corning or Cenco silicone stopcock grease in 250 ml. of methylene chloride and dried in an oven at 50°C.

Ascending chromatographic technique was used in 12-x 24-inch red borosilicate glass jars with flat lids or, where only one or two strips were developed, in a 1-liter glass-stoppered cylinder. The jars and cylinders were lined with sheets of Whatman No. 1 filter paper and the equivalent of two 18-x 22.5-inch sheets were suspended in the large jar in addition, all being placed so that they dipped into the solvent. The developing solvent was a mixture of acetonitrile (redistilled 99 +% commercial grade) and of distilled water, the relative amounts of each varying as noted in the captions to the figures.

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8.51 STUDIES ON THE PROTEINS OF FISH SKELETAL MUSCLE. 1. ELECTROPHORETIC ANALYSIS OF CODLING EXTRACTS OF LOW IONIC STRENGTH

Connell, J. J. (Dept. of Scientific and Industrial Research, Torry Research Station, Aberdeen)
Biochemical Journal 54, No. 1, 119-126 (April, 1953)

Previous work (Roth, Biochem. Z. 318, 74; Hamoir, Biochem. Soc. Symp., No. 6, 8) has shown certain similarities between the proteins of the muscle of rabbit and of certain fresh water fish.

Fillets of codling (Gadus callarius Linn.) were minced at 0°C. and stirred for 1 to 3 hours in a phosphate buffer. After centrifuging, the extract was dialyzed about 48 hours in cellophane tubes and centrifuged again. Electrophoresis was carried out at +0.5°C. in a Tiselius apparatus.

Extracts were made at ionic strengths of 0.05, 0.1 and 0.2 and at a pH close to 7.5 in preliminary work. Subsequent routine work is being carried out at an ionic strength of 0.05 at which best resolution was obtained.

The electrophoretic diagrams of the codling muscle show the same general characteristics as those of rabbit or frog muscle. The mobilities of the proteins of codling muscle are greater than those of rabbit muscle.

7.611 (Cross Reference: 7.67)

Samples of a solution of the vitamins (17.5-microliter) in chloroform, N-hexane, or isopropyl alcohol were used per strip.

The strips were dried, after application of the sample, in a spare developing jar which contained a small amount of dry ice to furnish a carbon dioxide atmosphere. After development, the strips were dried in a similar manner, carbon dioxide being passed in from a cylinder to furnish circulation.

The strips were kept in the jar under carbon dioxide until they were scanned, which was done as described in previous publications (Anal. Chem. 24, 1952 (1952) and Anal. Chem. 24, 2019 (1952)).

The quantitative aspect of the determination is illustrated in table 1, in which the areas shown are those resulting from running five replicate strips with each of two solutions, one containing vitamin A palmitate and the other ∝ tocopherol, and five replicate strips to each of which was applied the same amount of both solutions.

It is shown that vitamin A can be separated from the oxidized vitamin by this method.

Table I. Concentration Area Data

Solution A 0.3291 grain of 1,040,000 U.S.P. units/gram of vitamin A palmitate per 100 ml of isopropyl alcohol.
Solution E. 0.5139 gram of pure commercial grade α tocopherol per 100 ml. of isopropyl alcohol.

Solution A, 0.0175 Ml. per Strip

| Strip number | Zonal area, square inches |
|---|---|
| 1 | 7 11 |
| 2 | 6 46 |
| 3 | 6 45 |
| 4 | 7 40 |
| 5 | 7 84 |
| Average | 6 91 |
| Dev. from av. | +6 2% −6 7% |

Solution E, 0.0175 Ml. per Strip

| Strip number | Zonal area, square inches |
|---|---|
| 6 | 2 55 |
| 7 | 2 78 |
| 8 | 2 69 |
| 9 | 2 80 |
| 10 | 2 48 |
| | 2 66 |
| | +5 3% −7 5% |

Solutions A and E, 0.0175 Ml. of Each per Strip

| Strip number | Area of A band, square inches |
|---|---|
| 11 | 7 37 |
| 12 | 7 37 |
| 13 | 6 90 |
| 14 | 6 53 |
| 15 | 7 23 |
| Average | 7 14 |
| Dev. from av. | +6 0% −8 5% |

Solutions A and E, 0.0175 Ml. of Each per Strip

| Strip number | Area of E band, square inches |
|---|---|
| 11 | 2 84 |
| 12 | 2 52 |
| 13 | 2 66 |
| 14 | 2 64 |
| 15 | 2 82 |
| | 2 70 |
| | +5 2% −6 7% |

8.53 (Cross References: 7.53, 4.13)

7.45 (Cross Reference: 8.42)

3.33 FISH HANDLING AND PROCESSING IN EUROPE -- CANNING TUNA

Empey, W. A. (C.S.I.R.O. Division of Food Preservation)
Fisheries Newsletter (Australia) 12, No. 4, 15, 17 (April, 1953)

Tuna canning in Norway, Denmark and the Netherlands is done on a relatively small scale, with a total annual production of about 4,000 metric tons. In France, however, about 13,000 metric tons of canned tuna is produced each year.

The white-fleshed albacore provides the greater part of the French pack, but a larger reddish flesh species weighing between 20 and 200 pounds is also processed. Both species are canned with or without prior cooking. The albacore are gutted at sea, packed in ice and held aboard the fishing vessels for up to three weeks before landing and delivery at the canneries. On arrival at the canneries, the fish are washed, either mechanically or by hand, and the heads removed. They are then cut into lengths by a series of circular knife blades and the pieces with skin intact are packed by hand into cans. A small quantity of strong salt brine, and in some cases a mixture of spices, is added before the cans are vacuum sealed and retorted. This pack is known as tuna "au naturel."

Most of the precooking in French tuna canneries is done in a boiling salt brine of about 16 degrees salinometer. Three-, four-, or five-pound cross-sections of the fish are boiled in the brine, with or without added spices, such as thyme and bay leaves, for about two hours. To avoid contact with metal surfaces during cooking, the chunks of fish are placed in paper-lined crates. After precooking, the crates are drained and spread on the floor or in racks to cool for a day. The chunks are then hand-trimmed and the skin removed before cutting into pieces and packing in cans. In the plants where filling

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 ABSTRACTER: Roy C. Stevens

3.8 FISH HANDLING AND PROCESSING IN EUROPE -- MARINATING

Empey, W. A. (C.S.I.R.O. Division of Food Preservation)
Fisheries Newsletter (Australia) 12, No. 4, 17 (April, 1953)

The annual production of marinated semi-sterile fish products in the four European countries visited by the author (Norway, Denmark, France, and the Netherlands) is between 6,000 and 7,000 metric tons. Most of these products are prepared from herring and sprats (brisling). In the preliminary curing treatment the headed fish, with gut intact, are held in barrels with salt, sugar and spices in the proportions of 100 parts by weight of fish, 13 to 15 parts of salt, 6 to 7 parts of sugar, and 1 to 2 parts of spices. Curing takes place at temperatures between 50° and 68°F. When the fish are judged sufficiently cured, they are skinned, gutted, boned, cut in pieces and packed in cans with different spiced sauces made of tomato paste, sugar, vinegar, etc.

Brisling are sometimes treated as above while in the round, and sometimes after beheading, gutting, and cleaning. These fish may be marketed in the barrels in which they are treated or may be transferred to cans. In some cases the entire processing is done in special "anchovy" cans. Brisling are also prepared as fillets in the canned form, with special spiced sauces, after their preliminary treatment in barrels.

In Norway and Denmark a special type of marinated herring product known as "rollmops" is prepared. Fillets of herring are washed in a salt solution and then treated for several days in an acid bath, generally an 8 percent solution of citric acid. When sufficiently ripened the fillets are rolled around a small piece of dill pickle, onion or cucumber, and fastened with wooden toothpicks.

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 ABSTRACTER: Roy C. Stevens

4.62 THE ANTI-OXIDANT ACTION OF WOOD SMOKE ON FISH OILS

Nikkila, O. E. and Linko, R. R.
Suomen kem. B 24, 74-81 (1951) (In English)

The oils were extracted from the fish (mackerel and herring) with chloroform, and distilled at 28° to 32°C. under reduced pressure. Drops were put on to filter paper for the autoxidation tests. Smoke treatment of the papers was carried out in an enclosed cabinet in which both the temperature and rate of flow of the smoke could be regulated; alder wood was used. At suitable intervals, fat constants, such as peroxide, aldehyde, acid, and iodine numbers, were determined; also the phenols absorbed by the oil during the smoke treatment were determined. The effect of smoke was compared with the effect of commercial anti-oxidants such as Progallin A and P (ethyl and propyl gallates), nordihydroguaiaretic acid and Tenox II. In rancid oil, smoked at 25° and at 100°C., smaller quantities of volatile substances were absorbed at the higher temperature; the peroxide value of oil smoked at 25°C. was unchanged, but in oil smoked at 100°C. it was halved. In all experiments, with both fresh and rancid oils, smoke was an effective anti-oxidant. During storage at 25°C., the maximum peroxide number was reached in untreated oil after 5 days and in smoke-treated oil only after 54 days. Smoke was many times more effective than the commercial anti-oxidants tested. The anti-oxidant effect of smoke is probably due not only to the phenols it contains but also to inactivation of the biocatalysts in the fish during the smoke treatment.



(The above article appears in Food Science Abstracts 25, No. 2, 149, March, 1953 and is reprinted here)

4.64 ANTIOXIDANTS IN PACKAGING FILM PROTECT CONTENTS

Anonymous
Food Processing 14, No. 6, 31-32 (June, 1953)

A number of paper manufacturers and converters are now said to be treating packaging materials with an antioxidant. The purpose of adding the antioxidant is to serve as a barrier to the entry of oxygen for many oxygen-sensitive packaged food products.

The antioxidant is said to render inactive any oxygen that penetrates the packaging material as well as any that may be present at the time of packing. Oils that may be absorbed by the wrapping material and are thus highly subject to oxidation through their greatly increased surface are also said to be stabilized.

When paraffin wax or polyethylene are used, the antioxidant is described as performing a double function. Both materials are subject to gradual degradation from oxidation, but the antioxidant retards this action, in addition to protecting the contents.

 ABSTRACTER: Roy C. Stevens

TUNA CANNING IN EUROPE

ANTIOXIDANT ACTION OF WOOD SMOKE

PROCESSING MARINATED PRODUCTS IN EUROPE

ANTIOXIDANTS IN PACKAGING MATERIALS

4.64 (Cross Reference: 3.238)

3.33 (Cross Reference: 1.1)

machines are used, the cooked fish is placed in a long cylindrical mold which opens up sideways; the cylinder is then closed and a plunger forces the fish through until slices which fit into the can are cut off.

Where the Toquer system is employed, the fish, cut in steaks, is fitted into a ring-shaped mold and carried on a conveyor through a cooking and drying tunnel before it is transferred directly from the mold into the can. Tuna canners in France generally believe that precooking in steam or dry air gives less satisfactory results than cooking in brine. Olive oil is poured over the packed fish and the cans are held, often overnight, to allow penetration of the oil before the cans are vacuum sealed and retorted.

Small pieces of fish remaining from the packing operation are canned as tuna fragments. A special luxury pack is prepared from flakes or slices taken from the pectoral and belly flap portions of the fish.

3.8 (Cross Reference: 1.2)

To extend the storage life of these perishable products, they must be held at comparatively low temperature, above freezing. Storage life at ordinary temperatures can be prolonged by the use of small concentrations of permissible preservatives such as sodium benzoate, esters of benzoic acid, and in some instances by hexamethylene-tetramine.

7.53 DETERMINATION OF THE KEEPING QUALITY OF HERRING

Anonymous
Meld. S.S.F., No. 5, 99-107 (1951)

Methods employed at the Norwegian herring oil and meal industry research institute (S.S.F.) for judging the quality of herring are surveyed. (1) The fat phase. The difference in free fatty acid value between the expressed oil and the total fat (ether extract) is used to give an indication of oil yield; the smaller the difference, the greater the expected yield. Limiting values, beyond which the herring are considered unusable, are about 5 to 6% of free fatty acids in the expressed oil and 10 to 12% in the total fat. The analytical methods are described. (2) The protein phase. The content of ammonia in a sample indicates the extent of protein breakdown. The content of trimethylamine can be used as an indication of bacterial activity. Ammonia + trimethylamine indicates the extent of spoilage. The limiting value for usable herring is 100 to 120 mg. of total volatile nitrogen per 100 g. The analytical methods, employing Conway units, are described.



(The above article appears in Food Science Abstracts 25, No. 2, 156, March, 1953 and is reprinted here)

2.01 THE ACTION OF HYDROXYLAMINE ON BACTERIA

Tarr, H. L. A. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Journal of the Fisheries Research Board of Canada X, No. 2, 69-75 (April, 1953)

The effectiveness of hydroxylamine as compared with sodium nitrite for inhibiting the growth of bacteria in the flesh of lingcod, herring, halibut, and coho salmon was determined. The samples of fish flesh were blended in a Waring blendor. Aqueous solutions of hydroxylamine and sodium nitrite were added to produce the desired concentrations of bacteriostatic agent. Hydroxylamine concentrations were used ranging from 5 $\mu$g. to 240 $\mu$g. per gram of tissue. Sodium nitrite was used at a 200-$\mu$g. level. With the exception of coho salmon it was found that hydroxylamine was much more effective in inhibiting growth than sodium nitrite. In the case of coho salmon, sodium nitrite was found to be nearly as effective as hydroxylamine, but this is believed due to the fact that the pH of the salmon tissue does not become increasingly alkaline with spoilage. The effectiveness of sodium nitrite is greatly increased under non-alkaline conditions.

In further experiments the effectiveness of hydroxylamine at various pH values in inhibiting the growth of ten microorganisms isolated from spoiled fish tissues was studied. It was found that the inhibiting action of hydroxylamine was independent of pH.

Results of experiments with Staphylococcus aureus and Clostridium botulinum indicated that these organisms were, in general, somewhat less sensitive to hydroxylamine than the previous organisms studied.

 ABSTRACTER: W. N. Sumerwell

7.592 PURPLE PIGMENT AND PROTEIN IN THE THREADS OF THE SEA ANEMONE, ADAMSIA RONDELETI

Christomanos, Anast. (Department of Biochemistry, University of Athens)
Nature 171, No. 4359, 886-887 (May 16, 1953)

The purple pigment in the threads of the sea anemone Adamsia rondeleti can be extracted with distilled water. Previously it was necessary to coagulate the albumin proteins of the sea anemone by heating in order to liberate the pigment, but this treatment changed the purple color to yellow.

The purple pigment gives an intense blue fluorescence in ultraviolet light, the principal absorption maximum being at 555 m$\mu$, with smaller peaks at 465, 450 and 435 m$\mu$.

On heating, the aqueous extract becomes yellow. The pigment is changed to a colorless compound in strong acid but is more stable in basic solutions. At pH 12.93, however, a yellow color is produced along with an odor resembling trimethylamine.

The purple color was also changed to yellow when the aqueous extract was evaporated to dryness in a vacuum desiccator. In moist air the yellow color changes back to purple. The pigment appears to belong to the group of chromoproteins.

Chromatography of the hydrolyzed pigment shows the following amino acids: cysteine, threonine, serine, lysine, arginine, proline, tyrosine, trypotophane, hydroxylysine, and a further unidentified acid, together with tetramethylammonium hydroxide.

 ABSTRACTER: W. N. Sumerwell

7.80 A COMPARISON OF THE TRIANGULAR AND TWO-SAMPLE TASTE-TEST METHODS

Byer, Albert J. and Abrams, Dorothy (Wallerstein Laboratories, New York, N. Y.)
Food Technology 7, No. 4, 185-187 (April, 1953)

In triangular taste tests requiring the selection of the odd sample, results indicate that differences may be obscured by the test procedure itself. For this reason experimental parallel taste tests were carried out to compare odd sample selection by the triangular test and taste quality intensity by the two-sample procedure. Different concentrations of quinine or dextrose in aqueous solution were used for the tests. The two-sample test results reflected discrimination of higher statistical significance than did those of the triangular tests.

Quality judgments made within these experimental two-sample tests also achieved higher significance than the corresponding odd-sample selections. In fact, there was little, if any, tendency for tasters correctly selecting the odd sample to be more correct than the others in their quality judgment.

These findings demonstrate that assessment of taste-test methods is advisable to assure their effectiveness under given conditions.

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 ABSTRACTER: Kathryn L. Osterhaug

DETERMINATION OF KEEPING QUALITY OF HERRING

PIGMENT AND PROTEIN OF SEA ANEMONE

BACTERIOSTATIC ACTION OF HYDROXYLAMINE

TASTE-TESTING METHODS

7.592 (Cross Reference: 8.51)

7.53 (Cross Reference: 7.81)

7.80

TABLE 1
Taste-test results by triangular and two-sample procedures

| | No. of correct selections | No. of incorrect selections | Total | Percentage of correct selections | | No. of correct selections in excess of chance expectancy in $\sigma$ units |
|---|---|---|---|---|---|---|
| | | | | Obtained | Expected | |
| First bitterness test (Quinine sulfate solutions 0.0050% vs. 0.0075%) | | | | | | |
| Triangular test (for selection of odd sample) | 25 | 25 | 50 | 50% | 33⅓% | 1.50** |
| Two-sample test (for selection of more bitter sample) | 34 | 4 | 38 | 89% | 50% | 4.87*** |
| Second bitterness test (Quinine sulfate solutions 0.0050% vs. 0.0060%) | | | | | | |
| Triangular test (for selection of odd sample) | 21 | 25 | 46 | 46% | 33⅓% | 1.27* |
| Two-sample test (for selection of more bitter sample) | | | | | | |
| Trial 1 | 47 | 17 | 64 | 73% | 50% | 3.75*** |
| Trial 2 | 40 | 14 | 54 | 74% | 50% | 4.54*** |
| Sweetness test (Dextrose solutions 1.19% vs. 1.40%) | | | | | | |
| Triangular test (for selection of odd sample) | 21 | 24 | 45 | 47% | 33⅓% | 1.94* |
| Two-sample test (for selection of sweeter sample) | | | | | | |
| Trial 1 | 31 | 13 | 45 | 71% | 50% | 3.13*** |
| Trial 2 | 31 | 14 | 45 | 69% | 50% | 2.54** |

TABLE 2
Taste quality intensity designations (more bitter or less bitter, or more sweet or less sweet) in triangular test

| | No. correct | No. incorrect | Total | Percent correct | | No. correct in excess of chance expectancy in $\sigma$ units |
|---|---|---|---|---|---|---|
| | | | | Obtained | Expected | |
| First bitterness test (Quinine sulfate solutions 0.0050% vs. 0.0075%) | | | | | | |
| Quality designations by tasters correct in odd sample selection | 24 | 1 | 25 | 96% | 50% | 4.60*** |
| Quality designations by tasters incorrect in odd sample selection | 20 | 5 | 25 | 80% | 50% | 1.90** |
| Total | 44 | 6 | 50 | 88% | 50% | 5.17*** |
| Second bitterness test (Quinine sulfate solutions 0.0050% vs. 0.0060%) | | | | | | |
| Quality designations by tasters correct in odd sample selection | 15 | 6 | 21 | 71% | 50% | 1.97* |
| Quality designations by tasters incorrect in odd sample selection | 17 | 7 | 24 | 71% | 50% | 2.04* |
| Total | 32 | 13 | 45[a] | 71% | 50% | 3.83** |
| Sweetness test (Dextrose solutions 1.19% vs. 1.40%) | | | | | | |
| Quality designations by tasters correct in odd sample selection | 15 | 6 | 21 | 71% | 50% | 1.97* |
| Quality designations by tasters incorrect in odd sample selection | 21 | 5 | 26 | 81% | 50% | 3.14*** |
| Total | 36 | 11 | 47[a] | 77% | 50% | 4.05*** |

(*) (**) (***) See footnotes b and c to page 186.
[1] One taster counted in Table 1 did not make a bitterness designation and is not included here.
[a] Two tasters counted here did not participate in the two-sample test and are not included in Table 1.

2.114 THE ACTIVE RUDDER

Anonymous
Canadian Fisherman 40, No. 5, 24-25 (May, 1953)

One answer to the problem of how to steer a vessel which is making little or no headway is the Active rudder. This device, developed by a German firm, consists of an ordinary rudder having a built-in section containing a little power unit and a propeller, which can provide thrust in any desired direction, and instantaneous rudder reaction at any speed -- even at a standstill.

The heart of the Active rudder is an entirely water-filled, water-lubricated, and internally water-cooled, squirrel-cage, A. C. motor. This motor, which has only three bearings and requires no service or lubrication, together with the small propeller it drives, is housed in a jacket that is part of the normal rudder blade when installed. The unit is said to be adaptable to any existing rudder blade. The electric cable is introduced from the engine room through the hollow rudder shaft to the Active rudder motor.

The operation and control of the unit is carried out entirely from the wheelhouse by means of a control panel located in a position convenient to the wheel. The operation of these instruments is said to be very simple.

The captain of a fishing vessel on which the Active rudder was installed reported noticeable savings due to more reliable and smoother maneuvers during the laying and hauling of nets. Other advantages claimed for the unit are: reliable maneuvering going astern; power reserve when the main engine fails; and high economy at low speeds -- running on the Active rudder with the main engine stopped.

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 ABSTRACTER: Roy C. Stevens

1.95 WHAT HAS HAPPENED TO AMERICAN WHALING?

Gilmore, Raymond M. (Department of the Interior, U. S. Fish and Wildlife Service)
National Fisheries Institute Yearbook for 1953, pp. 37-38

The American whaling industry is inactive not because of the lack of whales, but because its principal products, whale oil and sperm oil, cannot compete successfully with vegetable oils and petroleum products. Hope for revival of the industry lies in the utilization of the fresh meat for human and animal consumption.

The decline of American whaling has been due primarily to high labor costs and to low market prices for whale and sperm oils, which are the principal products of the industry. The low prices are due to the competition of cheap vegetable oils and from the petroleum industry's progress in making better and cheaper lubricants.

Whale oil is a glyceride of the same general chemical composition as other animal and vegetable fats and oils. It contains a small semi-solid saturated fraction called stearine. Sperm oil is a liquid wax about 10% of which is a semi-solid fraction called spermaceti. It comes from a reservoir in the head of the common sperm whale, and from the much rarer bottlenose whale.

In Europe, where most of the world's supply of nearly 3 million barrels of whale oil is sold, margarine is made almost exclusively from this oil. Substitution of hydrogenated vegetable oils for animal fats in margarine in Europe might be considered fraudulent. Actually, both animal and vegetable oils, when hydrogenated, make excellent bases for margarine.

In the United States today there is a surplus of glyceridic oils, mostly from corn, peanuts, cottonseed, soya beans, and tallow. Margarine is made from vegetable oils,

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 ABSTRACTER: Kathryn L. Osterhaug

2.01 HISTOLOGICAL CHANGES IN THE MUSCLE OF FRESHWATER FISH DURING STORAGE

Partmann, W. and Maltschewsky, N.
Z. Lebensmitt.-Untersuch. u.-Forsch. 93, 121-130 (1951)

The histological changes which occur, owing to bacterial contamination, in muscles of freshwater fish, during prolonged storage at 18° to 20°C. were investigated. In samples of muscle from spoiled fish, there were marked differences in the extent of damage to the tissue, especially in the disappearance of cross striation. Bacterial infection led to changes located in the myosepta and in the connective tissue between the muscle fibres. Flavobacterium sulphureum and a species of Pseudomonas ureae attacked the whole of the muscle fibres very rapidly, without showing any selective behaviour towards specialized structural elements. Bacillus mesentericus and Bacillus subtilis were frequently found penetrating in the direction of the primary axis of the muscle fibres. The connective tissue of fish is probably much less resistant to bacterial attack, and decomposes more readily, than the corresponding tissue of warm-blooded animals. Preliminary experiments showed that the effects of bacterial contamination of fish tissues may be rather different at temperatures near 0°C.



(The above article appears in Food Science Abstracts 25, No. 2, 152, March, 1953, and is reprinted here)

2.119 RECENT GROWTH OF U. S. FISHING FLEET

Power, E. A. (Chief, Branch of Material Facilties, Defense Fisheries Administration, Washington, D. C.)
National Fisheries Institute Yearbook for 1953, pp. 29-31

During the years of 1940 to 1950 there has been a great increase in the number of fishing craft in the United States. The number of motor vessels of 5 net tons or over has increased from 5,562 in 1940 to 11,496 in 1950, while the number of power boats under 5 net tons in the United States, exclusive of the Mississippi River, has increased from 26,629 to 41,433. Unpowered boats, exclusive of the Mississippi River, declined in numbers during the same period from 23,014 to 20,082.

The large increase in motor vessels (50 net tons +) is the result of a greatly expanded construction and conversion program started in 1944 and still in progress. Approximately 107% more such vessels were in operation in 1950 than in 1940. In the years from 1936 to 1943 an average of 362 fishing vessels were documented per year. In 1944 to 1949 the average annual documentation was 991 with a high of 1,300 in 1947. The largest increase has taken place in menhaden boats on the South Atlantic Coast, in shrimp boats on the Gulf Coast and in tuna clippers, purse seiners, and small combination craft on the Pacific Coast.

There has been a 56% increase in the number of power boats (under 5 net tons) from 1940 to 1950. The largest increase occurred in the Middle Atlantic Coast hard clam industry where the number of boats went from 127 to 2598, an increase of 263%. The number of Maine lobster boats increased from 1921 to 4,688, and other gains were made in the number of gill netters in Alaska and in oyster and crab boats in Chesapeake Bay. The

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 ABSTRACTER: Keith A. Smith

AUXILIARY RUDDER PROVIDES MANEUVERABILITY

HISTOLOGICAL CHANGES IN FISH DURING STORAGE

AMERICAN WHALING

GROWTH OF U. S. FISH FLEET

2.119 (Cross Reference: 9.2)

number of small unpowered boats has decreased due to the availability of small engines and the prosperity of the fishermen.

From the increase of 107% in fishing vessels and 56% in power boats one would expect an increase of approximately 100% in the catch. However, the increase in landings from 1940 to 1950 was only 20%. In the years 1949-51 inclusive, the average total U. S. annual fish catch was 4,695,000,000 pounds as compared with 4,468,000,000 for 1939-41 inclusive, an increase of only 5%. The number of fishermen has increased between 1940 and 1950 from 125,795 to 161,463. Although the cost of operation and repair of vessels and gear has increased sharply, the volume of catch per man and per unit of gear has decreased. Yet fishermen received $244,919,000 more for their fish in 1950 than in 1940, an increase of 247%. From these facts it is evident that the ability of the fishermen to operate at a profit is contingent upon their continuing to receive a high price for their fish.

2.114

Seen here is the rudder and propeller assembly of the freighter "Ironguard Plunger" after her Active Rudder was installed in drydock

1.95 (Cross Reference: 6.0)

soaps from tallow and other animal fats and vegetable oils. The development of detergents has curtailed the use of fats and oils for soap. These factors operate against price and demand of whale oil and have rendered it almost unsaleable.

Sperm oil, being a wax, has been used largely as an additive for lubricants in high-pressure and high-temperature machines. The government has stockpiled a considerable quantity for strategic purposes and the petroleum industry has been very active in research and is producing lubricants which closely approximate, or even surpass, those composed of admixtures with sperm oil.

Cetyl alcohol is an important product obtained from sperm oil, but the supply of sperm oil is too unsteady and cetyl alcohol is too minor an item to support the industry.

The other products of the whaling industry are meat meal, bone meal, and soluble proteins. Despite the increasing demand for high protein meals for livestock food, the prices are not high enough to sustain the industry in the face of the present low oil prices.

It appears that the only hope for revival of our whaling industry would be the utilization of the meat for human consumption as well as for pets and fur-bearing animals.

Whale meat has been used as human food for centuries in Japan, and for many years in some European countries. Its nutritive qualities have been well established. The meat is without bone or gristle and usually without any appreciable amount of fat. It is officially permissible as a religious meat-like fish for Fridays and fast days, including Lent.

For a successful marketing operation it would be necessary to emphasize the economy of whale meat by holding its price to less than that of beef; perhaps to that of the better grades of fish. Quality would have to be carefully controlled through careful supervision in selecting the meat at the station to eliminate any "strong" meat before it reached the consumer. Techniques have been developed to lighten the color and to render the meat more tender; these might be used to advantage.

3.249 CONTROL OF RANCIDITY IN FISH FLESH. II. PHYSICAL AND CHEMICAL METHODS

Tarr, H. L. A. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Journal of the Fisheries Research Board of Canada II, No. 5, 237-247 (August, 1948)

Oxidation of the fat of frozen fish can be prevented by storing under high partial pressures of carbon dioxide or nitrogen. In the experiments reported, $CO_2$ caused a noticeable off flavor in all samples but nitrogen did not. Vacuum packing has also been found effective in the prevention of rancidity.

Table V. Effect of dipping red spring salmon steaks in l-ascorbic acid or sodium l-ascorbate solutions on fat oxidation during subsequent storage in the frozen state as shown by peroxide value

| Treatment | After days (no.) 45 | 122 |
|---|---|---|
| Dipped in distilled water | 2.6 | 7.2 |
| Dipped in 0.025% l-ascorbic acid | 1.5 | 2.8 |
| Dipped in 0.50% l-ascorbic acid | 0.3 | 1.6 |
| Dipped in 1.00% l-ascorbic acid | 0.0 | 0.2 |
| Dipped in 0.25% l-ascorbic acid pH 6.0* | 1.1 | 3.5 |
| Dipped in 0.50% l-ascorbic acid pH 6.0* | 0.6 | 1.3 |
| Dipped in 1.00% l-ascorbic acid pH 6.0* | 0.0 | 0.2 |

* Solutions adjusted to pH 6.0 with 1.0 N NaOH solution immediately before use.

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 ABSTRACTER: Kathryn L. Osterhaug

8.50 SULFUR DISTRIBUTION IN FISH FLESH PROTEINS

Beveridge, J. M. R. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Journal of the Fisheries Research Board of Canada VII, No. 2, 51-54 (May, 1947)

The sulfur distributions in the crude flesh proteins of lingcod, halibut, lemon sole, and white spring salmon have been determined.

Fat was extracted from the samples of dried fish flesh by soaking for 48 hours in 3:1 alcohol-ether solution. The solid matter was then filtered off and extracted with ether in a soxhlet apparatus for about 24 hours. The air-dried solid residues were then extracted three times with boiling water. The lingcod and lemon sole preparations could not be filtered efficiently and consequently the hot water was removed by centrifugation. The other samples were filtered.

In the proximate analysis of crude fish flesh proteins the moisture of the protein preparations was estimated by drying samples to constant weight in vacuo over phosphorus pentoxide; sulfur was determined as sulfate after fusion with sodium peroxide and sodium carbonate. Nitrogen was determined by the macro-Kjeldahl method.

Table I. Proximate analyses of crude fish flesh proteins. Nitrogen and sulfur figures are based on ash- and moisture-free material

| Source of protein | Moisture (%) | Ash (%) | Nitrogen (%) | Sulfur (%) |
|---|---|---|---|---|
| Lingcod | 3.21 | 1.31 | 16.51 | 1.213 |
| Halibut | 2.29 | 0.71 | 16.50 | 1.183 |
| Lemon Sole | 3.68 | 1.20 | 16.62 | 1.177 |
| White spring salmon | 2.95 | 0.67 | 16.60 | 1.166 |

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 ABSTRACTER: W. N. Sumerwell

2.01 STUDIES OF FISH SPOILAGE. VII. DIMETHYLAMINE PRODUCTION IN THE SPOILAGE OF COD MUSCLE PRESS JUICE

Beatty, S. A. and Collins, V. K. (Atlantic Fisheries Experimental Station, Halifax, N. S.)
Journal of the Fisheries Research Board of Canada V, No. 1, 32-35 (May, 1940)

The purpose of this work was to determine if bacteria are responsible for the dimethylamine which appears in small quantities during the spoilage of fish flesh and if so, what role the precursor of the amine plays in the metabolism of the microorganisms concerned.

The muscle was removed from codfish before it had gone into rigor and was minced and pressed. The volatile bases in a 5-ml. sample of muscle juice were distilled into an excess of acid and the excess of acid was neutralized. The neutralized distillate was diluted to yield a suitable concentration of dimethylamine. Dimethylamine was determined by Dowden's method using the Evelyn photoelectric colorimeter. Trimethylamine was calculated by subtracting the dimethylamine value so obtained from the total volatile bases not bound by formaldehyde.

To determine whether dimethylamine is produced by bacteria or by autolytic enzymes in the muscle juice, one sample of juice was allowed to stand in its normal condition while another sample was sterilized by filtration through a Seitz EK filter. It was found that the bacterial production of dimethylamine was rapid while the production in the sterilized juice was so small as to be barely measurable.

In other experiments it was found that both dimethylamine and trimethylamine develop more rapidly in the absence of air. This suggests that dimethylamine has a precursor corresponding to the precursor of trimethylamine, trimethylamine oxide, which acts as a

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 ABSTRACTER: W. N. Sumerwell

5.2 THIAMINASE IN AQUATIC ANIMALS OF NOVA SCOTIA

Neilands, J. B. (Atlantic Fisheries Experimental Station, Halifax, N. S.)
Journal of the Fisheries Research Board of Canada VII, No. 2, 94-99 (May, 1947)

The demonstration that a thiamine-destroying enzyme, thiaminase, caused the disease Chastek paralysis in fur animals has raised the question as to how widely distributed this enzyme is in fish. Consequently, the muscle and viscera of a number of fresh-water and marine animals have been tested for thiaminase activity.

The fish were taken from the water, frozen before the muscles developed rigor, and held in a cold room at -30°C. until analyzed. They were allowed to thaw at room temperature, after which the visceral organs (minus stomach contents) and a standard portion of muscle including the skin were disintegrated separately in a Waring blendor with an equivalent weight of 2% aqueous sodium chloride. The blended samples were divided into two portions, one being held in water at 100°C. for 30 minutes. The chemical procedure of Sealock, Livermore, and Evans for the determination of thiaminase was used in all experiments. For samples taken from sea fish, analyses were made both by the chemical method and by the yeast fermentation assay method of Schultz, Atkin and Frey as outlined by Tauber.

It was found that a greater percentage of fresh water fish contained thiaminase than did sea animals. In marine forms, measurable quantities of thiaminase were found only in the herring, lobster, clam, mussel, and scallop.

 ABSTRACTER: W. N. Sumerwell

CONTROL OF RANCIDITY IN FROZEN FISH

DIMETHYLAMINE PRODUCTION IN SPOILAGE

SULFUR DISTRIBUTION IN FISH PROTEINS

THIAMINASE IN FISH MUSCLE

2.01 (Cross Reference: 7.81)

hydrogen acceptor in the oxidation-reduction reactions that occur during the proliferation of certain bacteria.

5.2 (Cross Reference: 0.38)

3.249 (Cross References: 3.13, 4.61, 3.238)

Experiments described demonstrated that glazing fish steaks or fillets with ice formed from ordinary water decreased the rate of fat oxidation and that a glaze formed from 0.5 or 1.0% l-ascorbic acid solution was considerably more effective in this respect. A glaze formed from an 0.5% ethyl gallate solution was only about as effective as a water glaze in retarding rancidity.

Table I. Effect of storage in nitrogen or carbon dioxide gases on development of rancidity in fish samples stored at -10°C., as shown by peroxide value

| Treatment | | Herring | | Red spring salmon | | Coho salmon | | Pink salmon | Sole | |
|---|---|---|---|---|---|---|---|---|---|---|
| After days (no.) | | 40 | 98 | 40 | 98 | 40 | 98 | 40 | 40 | 98 |
| Stored in air | (Unbrined | 7.5 | 18.4 | 4.7 | 10.0 | 14.0 | 46.9 | 43.0 | --- | 45.0 |
| | (Brined | 9.8 | 76.3 | 10.1 | 30.2 | 5.6 | 7.7 | 16.0 | 5.8 | 11.4 |
| Vacuum then $CO_2$ added | (Unbrined | 0.1 | 0.8 | 0.0 | 0.4 | 0.1 | 0.2 | 0.0 | 0.0 | 1.8 |
| | (Brined | 1.2 | 1.5 | 0.4 | 0.6 | 0.2 | 0.2 | 0.9 | 0.0 | 2.0 |
| Vacuum, then nitrogen added | (Unbrined | 0.3 | 0.8 | 0.1 | 0.5 | 0.1 | 0.7 | 0.0 | 0.0 | 2.8 |
| | (Brined | 1.1 | 1.5 | 0.4 | 1.4 | 0.1 | 0.4 | 0.6 | 0.0 | 3.1 |
| Flushed with $CO_2$ | (Unbrined | 1.4 | 2.8 | 0.9 | 0.7 | 3.0 | 7.3 | 3.6 | 0.8 | 9.7 |
| | (Brined | 3.6 | 6.1 | 1.9 | 2.0 | 2.4 | 1.7 | 3.5 | 2.8 | 10.1 |
| Initial values | (Unbrined | 0.1 | | 0.0 | | 0.0 | | 0.0 | 0.0 | |
| | (Brined | 0.9 | | 0.4 | | 0.3 | | 1.0 | 0.0 | |

8.50 (Cross Reference: 8.42)

For the determination of the sulfur-containing amino acids, methionine and cystine, analyses were carried out in triplicate or quadruplicate by the Kassell and Brand modification of Baernstein's method. The distribution of methionine in the fish flesh proteins ranged between 3.64% and 3.82% and that of cystine was 1.36% to 1.47%. Of the proteins important in human nutrition, only egg albumin contains higher quantities of the sulfur-containing amino acids.

7.610 DETERMINATION OF VITAMIN A IN FISH LIVER OILS WITH ACTIVATED GLYCEROL DICHLOROHYDRIN

Sobel, A. E. and Werbin, Harold
Analytical Chemistry 19, No. 2, 107-112 (February, 1947)

The purpose of the work was to determine whether or not activated glycerol dichlorohydrin could be used in the quantitative estimations of vitamin A in fish liver oils. To do this, comparisons of this new method were made with the results obtained by the Carr-Price reaction and with the ultraviolet absorption method.

In the determination of known amounts of vitamin A added to fish oils, it was found that the antimony trichloride method had an average error of +0.94% on the whole oil and +0.65% on the unsaponifiable portions, whereas the glycerol dichlorohydrin method had an average error of +1.01% on the whole oil and +0.67% on the unsaponifiable portion. The mean error using the antimony trichloride method was ±3.11% on the whole oil and ±2.11% on the unsaponifiable portion, whereas the glycerol dichlorohydrin method had a mean error of ±2.80% on the whole oil and ±1.88% on the unsaponifiable portion.

In the comparison of vitamin A values of fish liver oils, the agreement between the values obtained by the glycerol dichlorohydrin and the antimony trichloride methods was close. However, almost all the values obtained by the ultraviolet absorption method were higher than the corresponding values obtained by the glycerol dichlorohydrin and antimony trichloride methods, and, as the extinction ratio of the oil ($\frac{300}{328}$ mu) increased, the deviation of the ultraviolet absorption results from those by the other two methods also increased.

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 ABSTRACTER: F. Bruce Sanford

7.85 RISE AND FALL OF BACTERIAL POPULATIONS IN FISH MUSCLE

Tarr, H. L. A. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Journal of the Fisheries Research Board of Canada 6, No. 2, 119-28 (August, 1943)

A direct microscopic bacterial count for fish flesh is described similar to the Breed and Drew method for milk. The method consists of spreading 0.01 ml. aliquots of a 1:4 aqueous extract of minced muscle on a 1 sq. cm. area of a microscope slide. The film is dried at 40°C. and fixed by immersion for 1 minute in 95% ethanol. The slides are stained by immersing for 1/2 minute in Loeffler's methylene blue, rinsed with water, and dried at 40°C. The bacteria which appear deep blue against a pale blue background are counted by means of a standardized microscope equipped with an oil immersion objective and a 6x eyepiece containing an ocular microscope field corresponding to $\frac{1}{2.65 \times 10^6}$ grams of fish muscle. This means that fish muscle containing $1 \times 10^5$ bacteria per gram would have only one organism in 26.5 microscope fields. Thus, this method could not be applied when there was less than $1 \times 10^5$ organisms per gram of muscle. Samples containing fewer organisms had to be incubated 24 hours at 15°C. before direct counts could be made. It is shown that there is no relationship between bacterial counts obtained prior to and subsequent to such incubation. This is probably connected with the lag phase during early stages of spoilage wherein bacteria do not multiply at all rapidly, whereas, during later spoilage, the lag phase is absent.

Direct counts, usually, but not invariably, yielded somewhat higher results than did viable counts made on identical material, but the course of bacterial increase, as measured by the two methods, was very similar.

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 ABSTRACTER: M. E. Stansby

7.87 A STUDY OF METHODS FOR ASSESSING RANCIDITY IN LARD

Grant, G. A. and Lips, H. J.
Canadian Journal of Research 24, No. 6, 450-60 (November, 1946)

Lard from 26 sources was stored in glass jars at 26.7°C. (80°F.) until definitely rancid. Spoilage was evaluated at two-week intervals by chemical tests and odor ratings. Correlation coefficients between odor scores and the logarithms of chemical test values were: iodometric peroxide, -.90; alpha-dicarbonyl test, -.85; Stamm test, -.82; Kreis test, -.81; ferrometric perodixe, -.80; fluorescence, .79; free fatty acids, -.10. Association between chemical measurements was greatest between alpha-dicarbonyl and iodometric peroxide values (r = .97). As peroxides are not thermostable, the measurement of the stable alpha-dicarbonyl compounds, although less precise, is considered the best available chemical method for assessing rancidity.

 Author's abstract

8.59 THE NON-PROTEIN NITROGENOUS CONSTITUENTS OF FISH AND LOBSTER MUSCLE

Campbell, James (Department of Physiology, McGill University)
Journal of the Biological Board of Canada 1, No. 3, 179-189 (January-February, 1935)

The chemical composition of fish muscle with regard to its nitrogenous constituents has been studied less than that of the muscle of warm-blooded animals. Such knowledge is important from the point of view of comparative zoology and physiology. Studies in dietetics are also important in evaluating the non-protein fractions of muscle and their influence on digestibility and nutrition, and possibly their secretagogue effect. Articles on the composition of fish muscle were reviewed in the paper of Kapeller-Adler and Krael (1930). The composition of haddock muscle was investigated by Komarov (1933).

The muscles chosen for the author's study were taken from cod (Gadus callarias), haddock (Melanogrammus aeglefinus), salmon (Salmo salar), herring (Clupea harengus), skate (Raja stabuliforis) and lobster (Homarus americanus). With the exception of cod and haddock, which are closely related, the rest of the samples represent very different types of muscle. Lobster muscle, representative of the crustacean, has a very powerful secretagogue effect on the gastric glands, as was found by Alley (1933). This indicated a possible variation in the non-protein nitrogen from it. The extracts of cod, herring and lobster were more particularly studied by the silver-baryta fractionation procedure of Kossel and Kutscher devised for the isolation of nitrogenous bases.

With the exception of herring, which was held 18 hours in the hold of the vessel, the samples were being extracted in from 1 to 4 hours after death. Muscle fillets were freed of all skin, scales and slime and minced well. The methods of preparation for the various extracts are given in great detail. The partition of nitrogen included determination of total non-protein nitrogen, volatile base nitrogen, ammonia nitrogen, urea nitrogen, amino

(over)

 ABSTRACTER: Wm. Clegg

VITAMIN A ANALYSIS

MEASUREMENT OF RANCIDITY

BACTERIAL COUNTS

NON-PROTEIN CONSTITUENTS OF FISH MUSCLE

8.59 (Cross Reference: 8.51)

nitrogen, creatinine and creatine and the imidazol groups. Procedures are given in full and, where difficulties were encountered in the preparation of the extracts, modifications are given. This applies also to the various fractionating procedures.

The distribution of the nitrogen in the muscle extracts of cod, herring and lobster was studied by the phosphotungstic acid and silver-baryta method. Two tables showing the distribution of non-protein nitrogen in muscle expressed as mg. nitrogen per 100 grams wet weight of tissue, and also as percent of the non-protein nitrogen are given. A third table expressed in the same units evaluates the histidine-arginine fraction and also the lysine fraction of cod, herring and lobster muscle. The latter table shows much variation for the two fractions, which are considered to have great physiological activity.

With the exception of cod and haddock muscle, which are closely related chemically, great differences in the composition of these tissues are shown. The chief characteristics of the tissue appear to be as follows: The total non-protein nitrogen of the muscle in the first four cases is of the same order; in lobster there is a 50% increase over this, while in skate muscle the amount is three and a half times as great. The constitutents responsible for this increase in skate muscle are urea, ammonia and other volatile bases. In lobster muscle the increase is due to the nitrogen of the "monoamino acid" fraction and of the histidine-arginine fraction.

Cod muscle is very rich in the lysine fraction and poor in the histidine-arginine fraction. In lobster muscle the lysine fraction is slightly less than in cod muscle but the nitrogen of the histidine-arginine fraction is extremely high.

The position of these forms of fishes in the morphological scheme seems to be related to the chemical composition. As evidence of this it may be noted that cod and haddock, of the same family, have muscles of similar composition, but they are distinctly different, in this respect, from the other forms.

7.610

In a comparison of the percent deviations of the antimony trichloride and ultraviolet absorption values on whole oil from those for glycerol dichlorohydrin, +14.58% was found to be the average for the antimony trichloride method and +64.53% was found to be the average for the ultraviolet absorption method. When the results for two oils that gave a typical color reaction were omitted, the average deviation for the antimony trichloride method was -1.62% and that for ultraviolet absorption was +17.11%.

In a comparison of the percent deviations of the antimony trichloride and ultraviolet absorption values on unsaponifiable oil from those for glycerol dichlorohydrin, the average deviation of the antimony trichloride values was -4.11% while that for the ultraviolet absorption was +26.25%.

When percent deviations of vitamin A content values of whole oil from those of the unsaponifiable fraction in fish liver oils were studied, it was found that, on the average, the values obtained by the glycerol dichlorohydrin method on the whole oils were 2.52% lower than those obtained on the unsaponifiable fraction, while for the antimony trichloride and ultraviolet absorption methods the whole oil vitamin A values were about 7.5% high. Thus, on the oils analyzed by the glycerol dichlorohydrin method, the trend was for the vitamin A in the whole oil to be closer to that in the unsaponifiable fraction than was found to be the case in the other two methods. The authors hope to conduct further research which will clarify this point.

Since good agreement was found between the values obtained by the glycerol dichlorohydrin and antimony trichloride methods, and since activated glycerol dichlorohydrin possesses many advantages over the antimony trichloride reagent, the authors recommend the use of activated glycerol dichlorohydrin in the determination of vitamin A in fish liver oils.

7.85 (Cross References: 2.01, 1.3, 1.6)

Bacteria increased very much more slowly in whole fish than in excised muscle. In salmon muscle, bacteria developed less rapidly than in halibut muscle.

1.1 FISH HANDLING AND PROCESSING IN EUROPE--CANNING TUNA

Empey, W. A.
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(Abstract of this article appears under 3.33 page 11)

1.2 FISH HANDLING AND PROCESSING IN EUROPE--MARINATING

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Tarr, H. L A.
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1.5 THE NUTRITIVE VALUE OF MARINE PRODUCTS. X. PROXIMATE ANALYSIS OF LING COD

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(Abstract of this article appears under 3.249 page 17)

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6.130 100% UTILIZATION FOR TUNA INDUSTRY

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(Abstract of this article appears under 2.119 page 15)



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